S6-107475/17 A83 (A35) LUTZ/ 00.00.84
LUTZ N *DE 3437-786-A
16.10.84-DE-437786 (+DE-405964) (17.04.86) A43b-17/14
Inner sole of thermoplastics heated by microwaves - then shaped to foot of wearer inside shoe and finally hardened
C86-045899

The parent patent describes a method of making an inner sole for a shoe adapted to fit the individual foot of the wearer by using a sole of a material such as silicone rubber, shaping it by placing the sole inside the shoe and pulling the shoe onto the foot, then hardening the inner sole by microwave irradiation.

In the patent of addn., soles of thermoplastics materials are used, and are heated either before or after placing in the shoe by microwave irradiation to soften them; the shoe is then pulled onto the foot of the wearer and thus shaped to the required form.

The material may contain additives having a high microwave absorption capacity.

USE/ADVANTAGE

For producing an inner sole to a shoe which exactly fits the foot of the wearer. The process is extended to the use of a wider range of materials.

MATERIALS

Typical thermoplastics materials used, in either solid or foam form, are e.g. PVC, polyethylene, polypropylene or polyurethane.(6pp236NMSDwgNo0/0).

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(61) Zusatz zu: P 34 05 964.4

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(54) Verfahren zum Herstellen von Schuheinlegesohlen

Es wird ein Verfahren zum Herstellen von Schuheinlegesohlen mit genauer Paßform beschrieben, bei dem zunächst ein Paar Sohlen mit ungefährer Paßform hergestellt, dieses in individuell ausgesuchte Schuhe eingelegt und dort mit den Füßen durch Anziehen der Schuhe der Fußform angepaßt sowie durch Mikrowellenbestrahlung erwärmt wird. Die Sohlen sollen aus massivem oder aufgeschäumtem thermoplastischem Werkstoff hergestellt und vor oder nach dem Einlegen in die ausgesuchten Schuhe durch Mikrowellenbestrahlung auf Erweichungstemperatur gebracht werden. Damit die Mikrowellen ansprechen, werden dem Sohlenwerkstoff in gleichmäßiger Verteilung oder an ausgesuchten Stellen Stoffe mit hoher Mikrowellenabsorption zugesetzt.

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(54) A Process for Producing Shoe Insoles

A process for producing precisely fitting shoe inserts is described, with which, first a pair of approximately fitting soles is produced, this being inserted into individually desired shoes, and there the foot mold being matched to the feet by putting on the shoes and heated by microwave radiation. The soles are to be made from solid or foam thermoplastic material, and are brought to the softening temperature by microwave irradiation before or after insertion into the desired shoes. Substances with high microwave absorption are added to the sole material in uniform distribution or at desired places so that the microwaves are absorbed.

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Claims

1. A process for producing precisely fitting shoe insoles in which first a pair of approximately fitting soles is produced, these are inserted into individually desired shoes and there the foot mold is matched to the feet by means of putting on the shoes as well as heated by means of microwave radiation in accordance with Patent 34 05 964.4, characterized by the fact that the soles are made of thermoplastic material, brought to softening temperature by means of microwave radiation after insertion into the desired shoes and the foot mold then matched by putting on the shoes.

2. A process in accordance with Claim 1, characterized by the fact that materials with a high microwave absorption are added in a uniform distribution or at desired points.

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A Process for Producing Shoe Insoles

Patent ..... (Patent Application P 34 05 964.4) describes a process for producing precisely fitting shoe insoles which is characterized by the following stages of the process:

a) Producing a pair of approximately fitting insoles from a plastic, hardenable material, also elastic after hardening;

b) Insertion of the soles into individually desired shoes and, in a given case, covering with added soles;

c) Stressing the insoles with the feet by putting on the shoes until precise fitting of the soles to the feet;

d) Hardening the insoles by means of cold or hot reaction.

An elastically hardening silicon rubber is proposed in Patent Application P 34 05 964.4 as a preferred material for carrying out this process. Preferably an addition of flake graphite is added to the material, so that the heat treatment may be carried out by means of microwave radiation.

Further experiments now determine that under certain circumstances it may be advantageous to use a thermoplastic material instead of the hardening material, therefore, for example, the above-mentioned silicon rubber. The well-known materials polyvinylchloride, polyethylene, polypropylene, or polyurethanes may be considered as the thermoplastic material, it being possible to use all of the above-mentioned substances either as solid substances or as foam substances.

The use of such thermoplastic substances for carrying out the process has the advantage that the process can be carried out for the most part more rapidly and that an expanded range of materials is made available. Then the process is carried out so that also approximately fitting soles are produced first and these are brought to the softening temperature by microwave irradiation before or after insertion into the desired shoes. If the heating takes place outside of the shoes, the soles thus preheated have to be inserted into the shoes. If the heating takes place inside the shoes, the shoe is ready for fitting immediately, which takes place as in the case of the main patent by putting on the shoes.

As already proposed in the main patent, the heating here is to be performed by means of microwave irradiation. This process, known in and of itself, has the advantage that the heat does not have to be conducted from outside into the insole, but arises

immediately within the material, uniformly over the entire cross-section. In the case of most thermoplastic materials, however, it is necessary to introduce a foreign material with a high microwave absorption. The thermoplastic substance alone, as a rule, does not absorb microwaves, and, therefore, cannot be heated by them. However, heating does take place if one of the above-mentioned substances is introduced, the heat generation then being limited to the place at which substances with high microwave absorption are located. Water or substances containing water such as flour, gypsum, or the like, or also graphite, preferably flake graphite, and also lampblack and similar substances, are considered as substances with a high microwave absorption.

The use of the process of microwave radiation for heating the shoe insoles consisting of thermoplastic material also offers the advantage that the sole can be partially softened at desired places in this way, while in other places it maintains its usual hardness or compression resistance. This takes place as a result of the fact that substances with high microwave absorption with locally nonuniform distribution are incorporated into the material at desired places. The places may be determined ahead of time by being punched into a desired mold, the punched out areas then being replaced by a material with an incorporated absorption agent.

The process described here is of particular advantage in the case of application for ski boots. Ski boots today are practically always made of plastics, therefore of materials which by nature have no microwave absorption. If a sole made of thermoplastic material with substances of high microwave absorption introduced uniformly or at locally desired places is inserted into such a ski boot, in order to fit the sole to the individual foot of the later wearer, it is sufficient to insert the entire boot into the microwave oven and irradiate it for several seconds to at most minutes. The shoe itself is not influenced by this treatment, only the shoe insole is softened in those places in which substances of high microwave absorption are located. When the treatment is completed and the shoe itself has become quite cold (it is at room temperature), the shoe may be put on, only the softened places of the insole being deformed in accordance with the foot shape. Experiments have shown that the amount of heat stored in the sole is low, so that no uncomfortable feeling of heat is felt by the foot itself.

The thickness of such shoe insoles made of thermoplastic material, depending upon the particular case of application, amounts to between 1 and 20 mm; greater thicknesses also may be produced, but in most cases provide no additional effect. The temperature of the insole, depending on the material, has to be raised to between 80°C and 160°C. This temperature is completely inconceivable, in particular in the case of foam mat rials, since

the substances have low heat conductivity, and only a delicate surface zone is in contact with the foot itself.